

METHOD 7450

MAGNESIUM (ATOMIC ABSORPTION, DIRECT ASPIRATION)

1.0 SCOPE AND APPLICATION

1.1 See Section 1.0 of Method 7000.

2.0 SUMMARY OF METHOD

2.1 See Section 2.0 of Method 7000.

3.0 INTERFERENCES

3.1 See Section 3.0 of Method 7000 if interferences are suspected.

3.2 All elements forming stable oxyanions (P, B, Si, Cr, S, V, Ti, Al, etc.) will complex magnesium and interfere unless lanthanum is added. (See Method 7000, Paragraph 3.1.1.) Addition of lanthanum to prepared samples rarely presents a problem because virtually all environmental samples contain sufficient magnesium to require dilution to be in the linear range of the method.

4.0 APPARATUS AND MATERIALS

4.1 For basic apparatus, see Section 4.0 of Method 7000.

4.2 Instrument parameters (general):

4.2.1 **Magnesium hollow cathode lamp.**

4.2.2 **Wavelength:** 285.2 nm.

4.2.3 **Fuel:** Acetylene.

4.2.4 **Oxidant:** Air.

4.2.5 **Type of flame:** Oxidizing (fuel lean).

4.2.6 **Background correction:** Required.

5.0 REAGENTS

5.1 See Section 5.0 of Method 7000.

5.2 Preparation of standards:

5.2.1 **Stock solution:** Dissolve 1.000 g of magnesium metal (analytical reagent grade) in 20 mL 1:1 HNO₃ and dilute to 1 liter with Type II water. Alternatively, procure a certified standard from a supplier and verify by comparison with a second standard.

5.2.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed after processing, including 1 mL lanthanum solution per 10 mL solution (see Paragraph 3.2).

5.2.3 **Lanthanum chloride solution:** Dissolve 29 g La_2O_3 in 250 mL concentrated HCl -

(CAUTION: REACTION IS VIOLENT!) -
and dilute to 500 mL with Type II water.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Three, Section 3.1.3, Sample Handling and Preservation.

7.0 PROCEDURE

7.1 Sample preparation: The procedures for preparation of the sample are given in Chapter Three, Section 3.2.

7.2 See Method 7000, Paragraph 7.2, Direct Aspiration.

8.0 QUALITY CONTROL

8.1 See Section 8.0 of Method 7000.

9.0 METHOD PERFORMANCE

9.1 The performance characteristics for an aqueous sample free of interferences are:

Optimum concentration range: 0.02-0.05 mg/L with a wavelength of 285.2 nm.

Sensitivity: 0.007 mg/L.

Detection limit: 0.001 mg/L.

9.2 In a single laboratory, analysis of a mixed industrial-domestic waste effluent, digested with Method 3010, at concentrations of 2.1 and 8.2 mg/L gave standard deviations of ± 0.1 and ± 0.2 , respectively. Recoveries at both of these levels were 100%.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, December 1982, Method 242.1.

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